Beach Water Quality Management Decision Support Systems for Forecasting Probability of Exceeding E. coli Levels.

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CEGLHH
NOAA Center of Excellence for Great Lakes and Human Health

NATIONAL WEATHER SERVICE

NOAA Center of Excellence for Great Lakes and Human Health

- Develop sustainable forecasting tools to minimize risk to human health in coastal environments.
- Identify sources and causes

Water Quality
Beach Postings
Harmful Algal Blooms

Predictive Variables for Statistical Beach Forecasting Models

Mednick, 2009

Near Shore Conditions ****Predictive Parameters***

- *Wave height
- *Lake current speed and direction
- *Water temperature
- *Lake level
- Turbidity

Weather Conditions

- *Antecedent rainfall
- *Wind speed and direction
- *Air temperature
- *Sunlight

Onshore Conditions

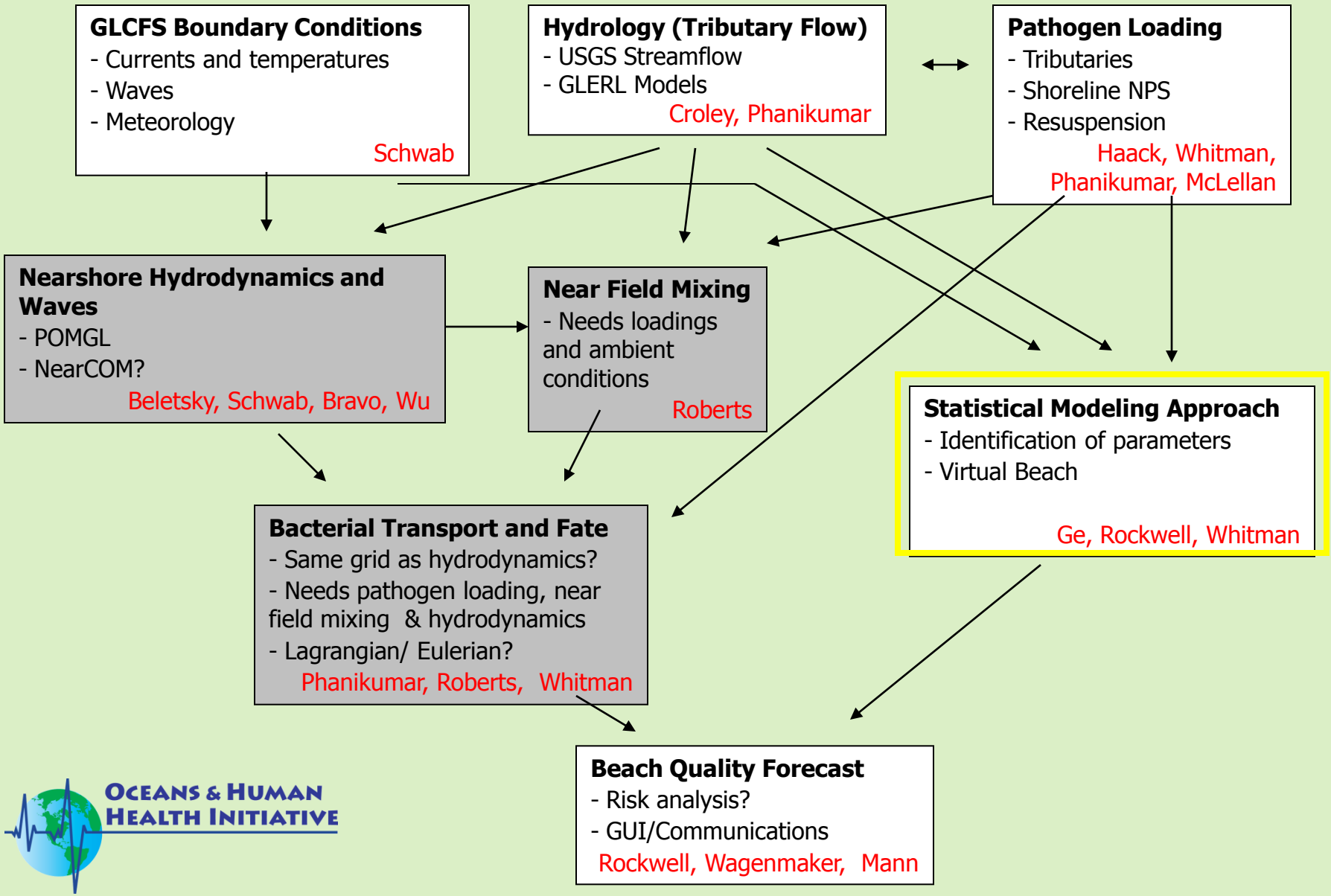
- Number of bathers
- Presence of algae
- Number of gulls

Watershed Conditions

-* Stream flow

Mednick 2009: (Accessing Online Data for Building and Evaluating Real-Time Models to Predict Beach Water Quality)

Statistical Beach Quality Modeling Approach



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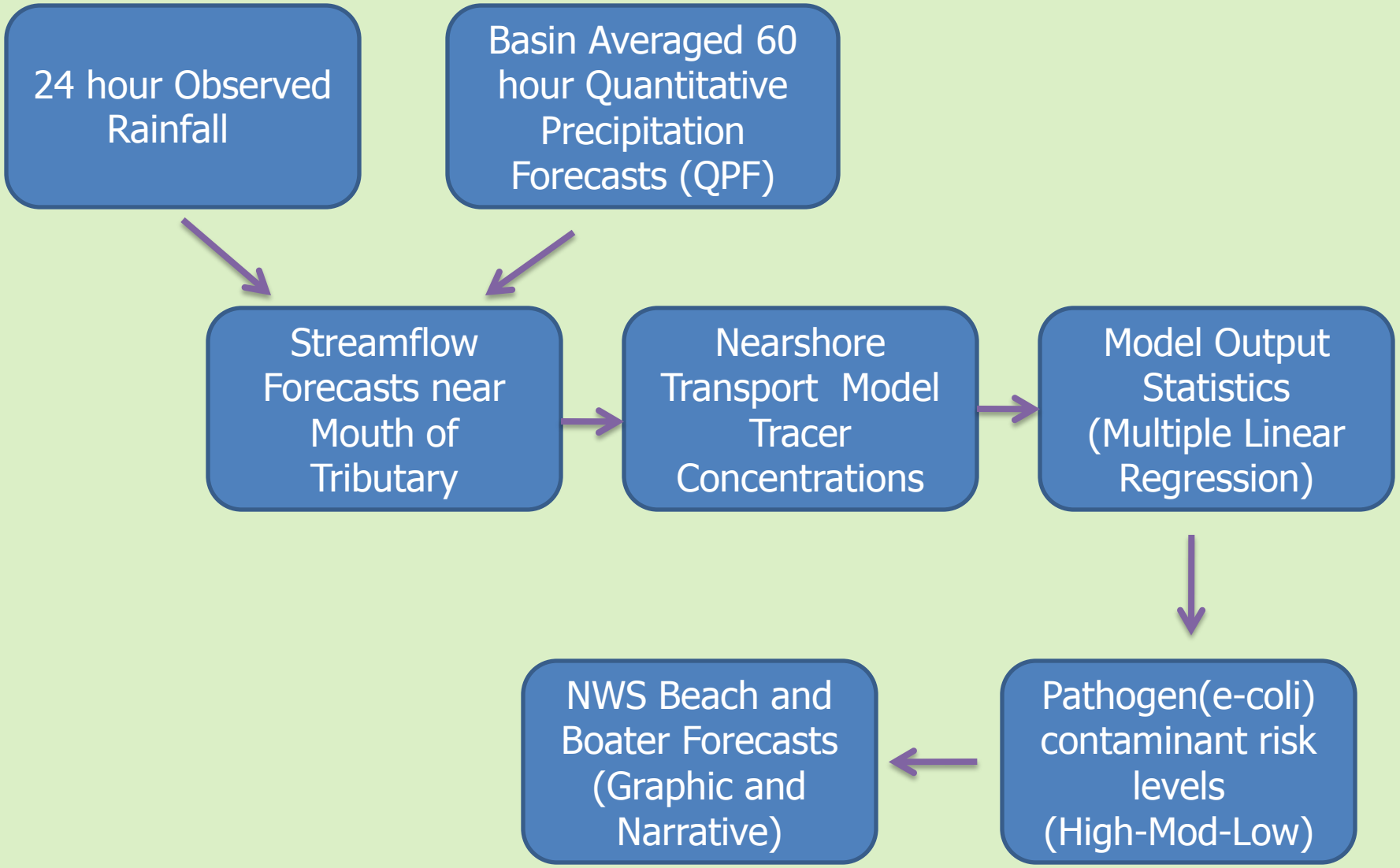
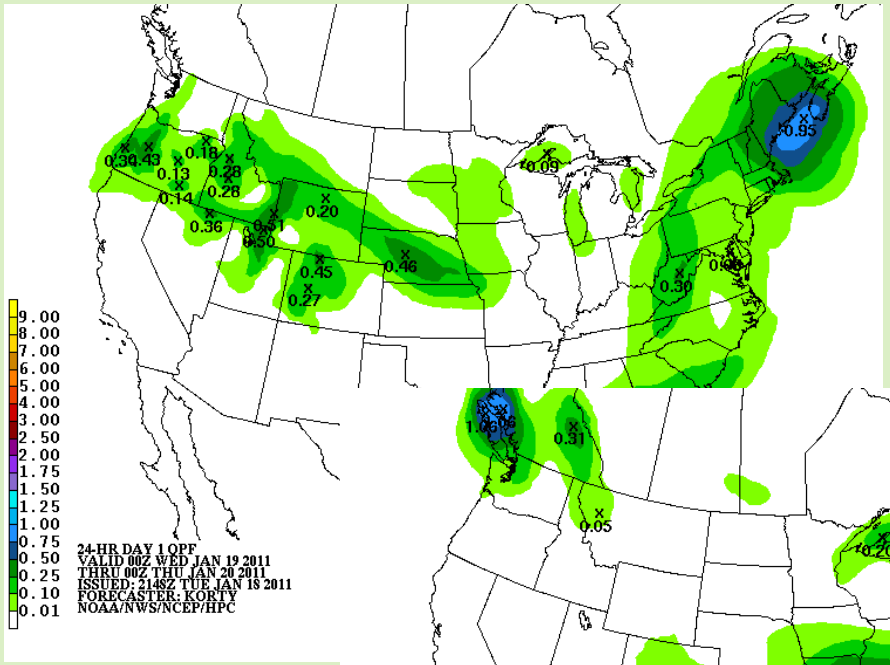
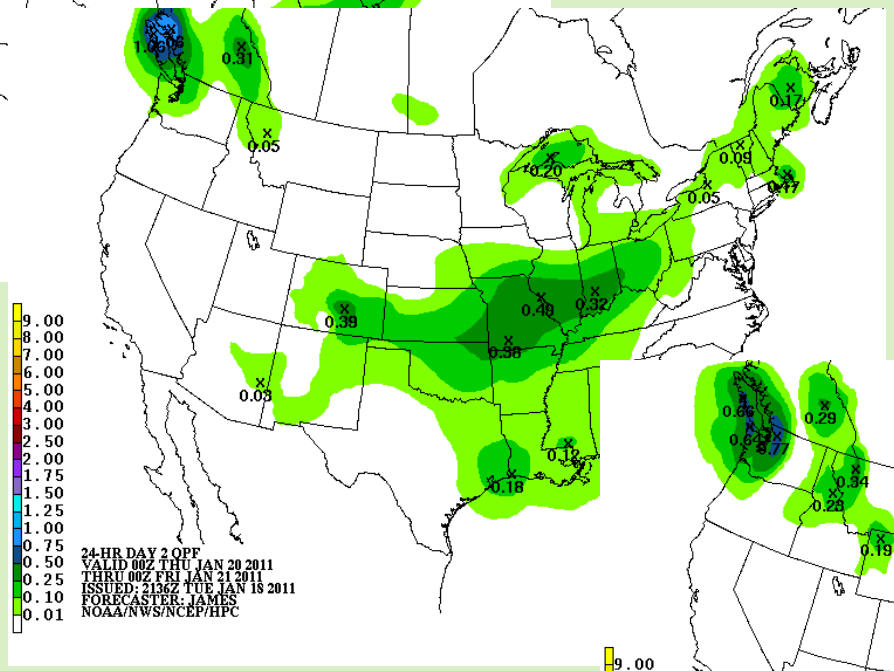
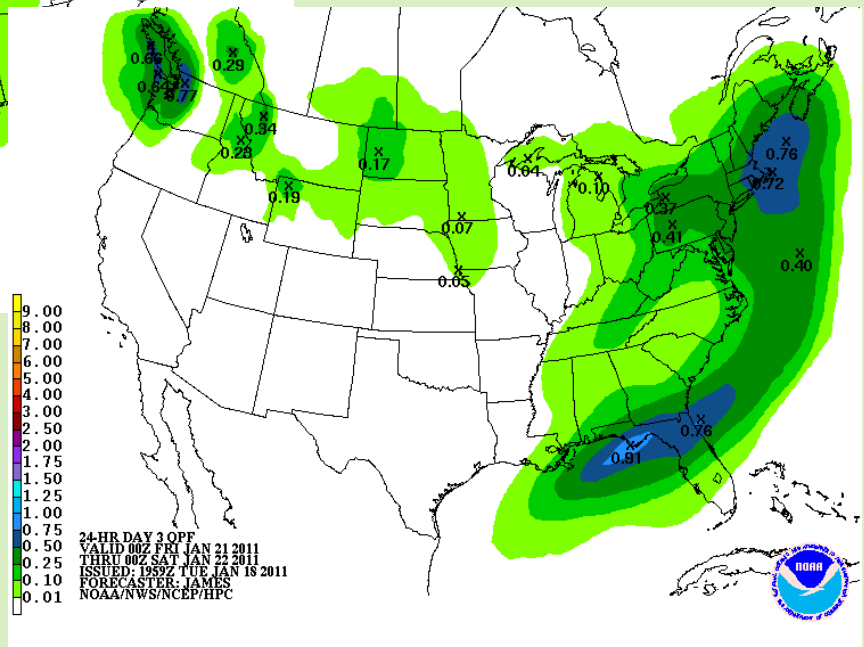
Combined Process-Statistical Model Approach to Beach Health Forecasts



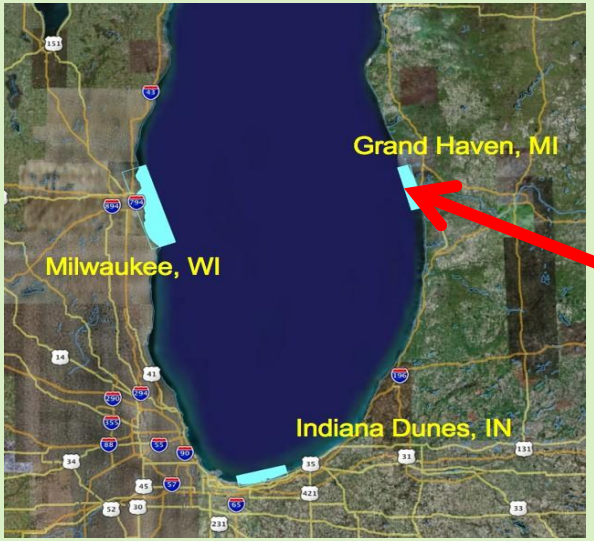
Large Scale Quantitative Precipitation Forecasts (Days 1-3) from Hydromet Prediction Center

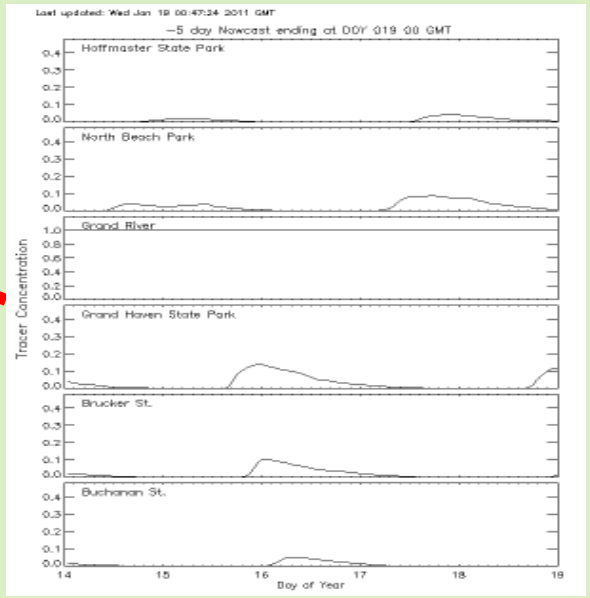


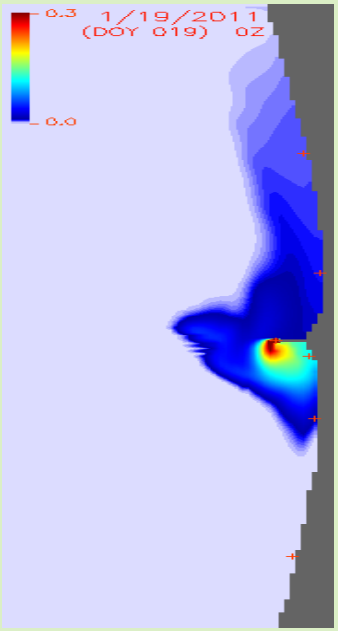


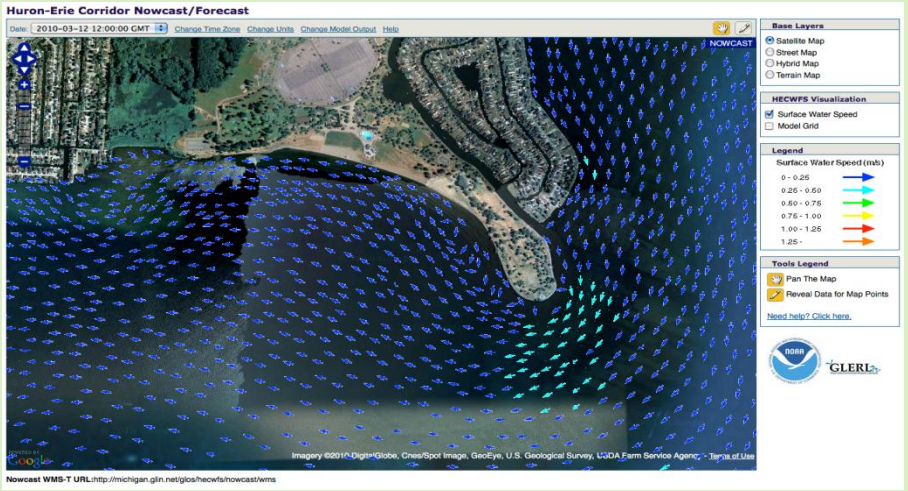


High resolution hydrodynamic models: grid nesting and unstructured grids

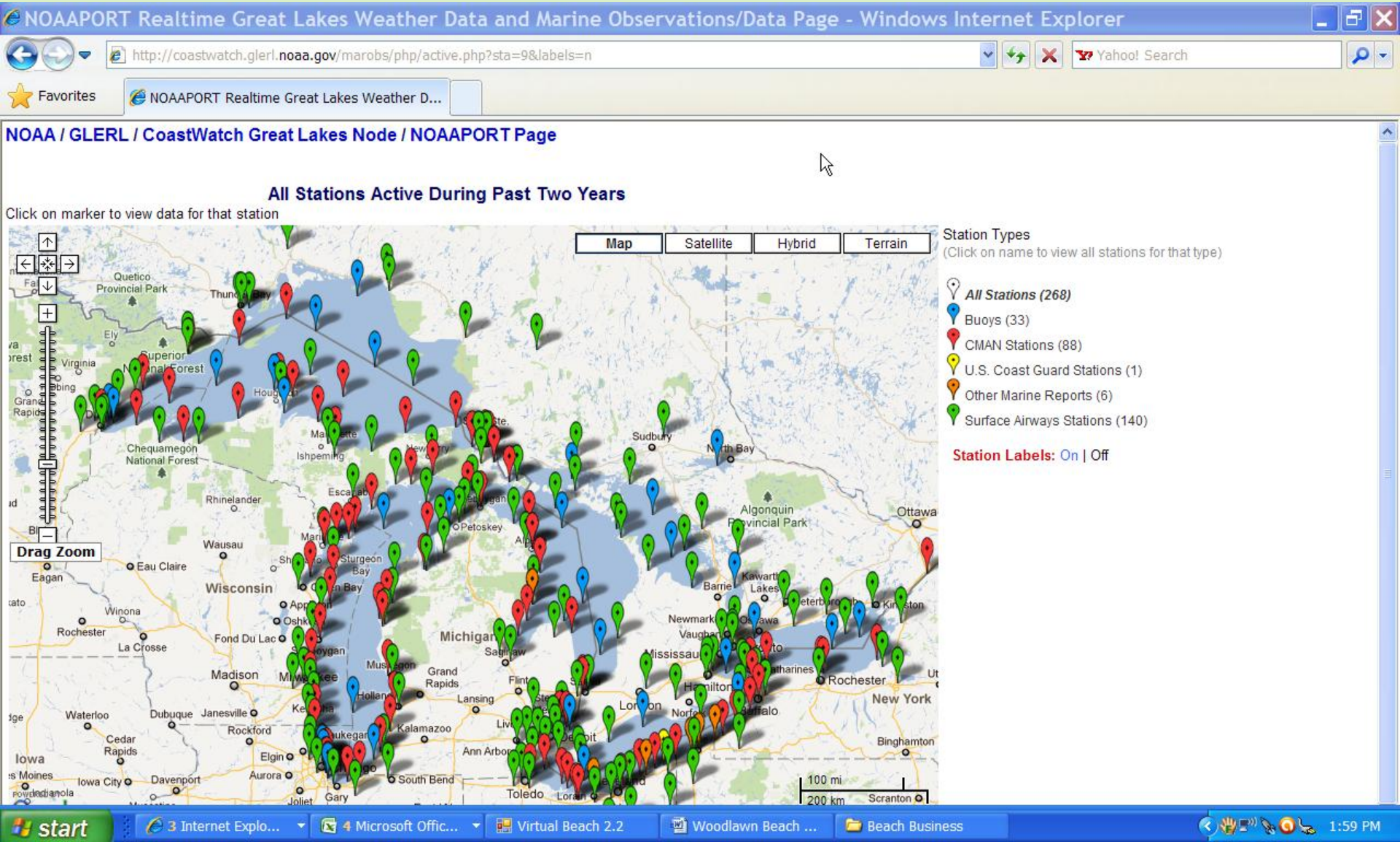


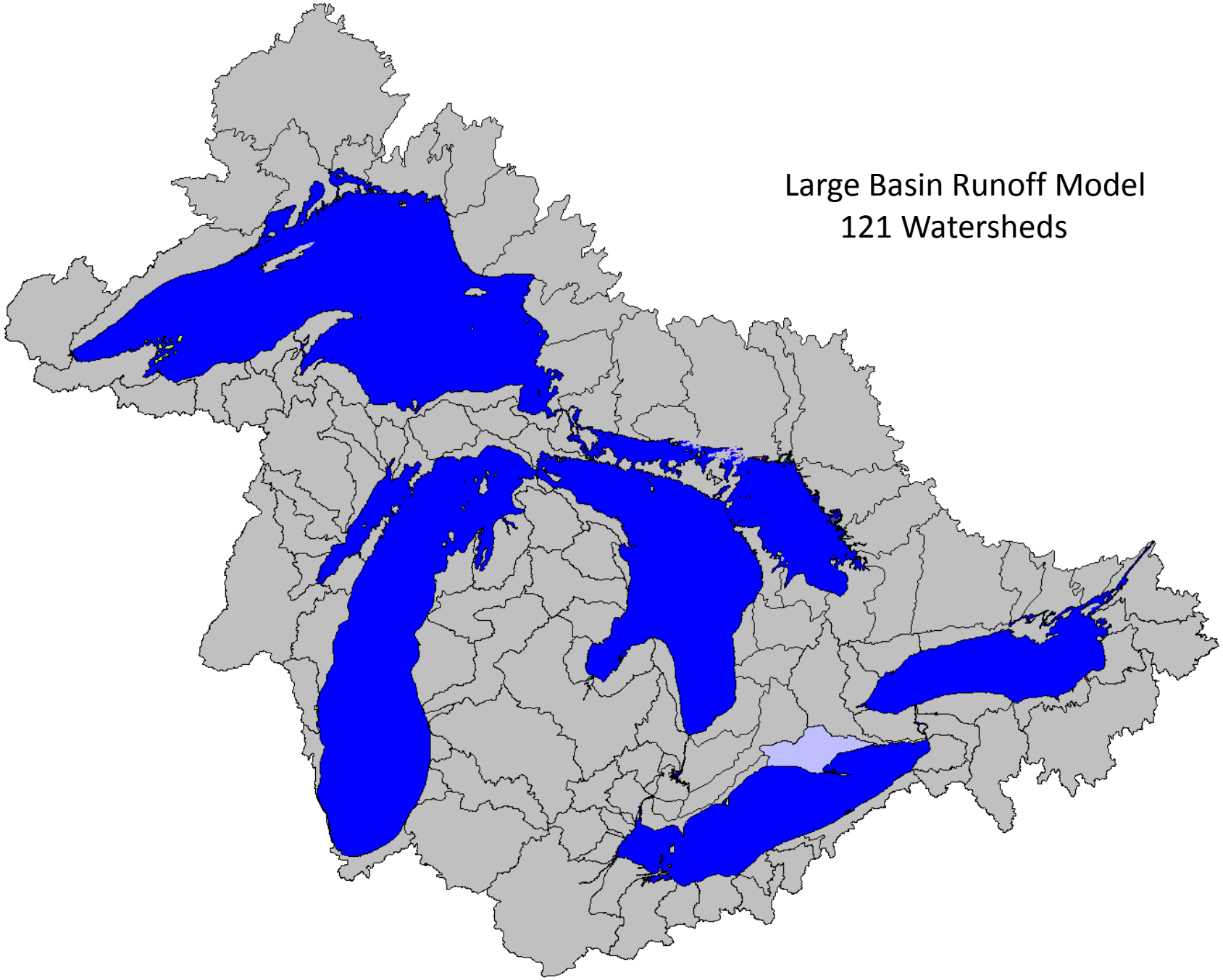






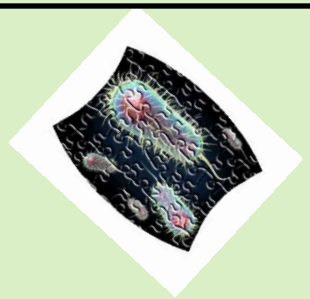
NOAA/GLERL/ CoastWatch Stations




Large Basin Runoff Model
121 Watersheds
Credit Tim Hunter NOAA GLERL

Decision Support Systems for Beach Water Quality Management Being Applied in Many Geographical Areas Using USEPA GLRI Funding

Red Flags - NOAA
Green Flags - USGS
Yellow Light Bulbs - USEPA
Yellow Pins - WDNR Nowcast Models Using EPA's Virtual Beach Software
Blue Push Pins - NOAA-NWS – CEGLHH/CILER
Orange Push Pins - NOAA-GLERL– CEGLHH/CILER



TURNING DATA

INTO

DECISIONS

Virtual Beach

Empirical Decision Support Software for
Pathogen Indicators in Recreational Waters

Version 2.2

U.S. Environmental Protection Agency
Office of Research and Development
National Exposure Research Laboratory
Ecosystems Research Division
Athens Ga.

Results from Forecast Decision Support Systems For 2010 E. coli Measurements at 19 Beach Sampling Sites

Type of Decision Support System	R^2 %	adjR^2 %	Accuracy %	Specificity %	False Positives	Sensitivity %	False Negatives	Total Errors
Training	39.4	38.0	88.4	93.7		30.3		
Forecast			86.6	91.1	3.9	27.4	5.9	9.8
Persistence			82.2	87.5	6.9	20.3	7.9	14.8
Always Open			86.0	100.0	0	0	12.8	12.8

Low-Moderate- High Risk Levels communicated to Beach Managers and Other Users via NWS Recreational Beach/Boater Forecasts

Acknowledgements

NOAA Great Lakes Regional Collaboration Team

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Indiana Department of Environmental Management

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Questions?